

Scientific Inquiry

5-1 The student will demonstrate an understanding of scientific inquiry, including the foundations of technological design and the processes, skills, and mathematical thinking necessary to conduct a controlled scientific investigation.

5-1.6 Evaluate results of an investigation to formulate a valid conclusion based on evidence and communicate the findings of the evaluation in oral or written form.

Taxonomy Level: 5.2-B Evaluate Conceptual Knowledge

Previous/Future knowledge: In 2nd grade (2-1.3), students represented and communicated simple data and explanations through drawings, tables, pictographs, bar graphs, and oral and written language. In 3rd grade (3-1.7), students explained why similar investigations might produce different results. In 4th grade (4-1.6), students constructed and interpreted diagrams, tables, and graphs made from recorded measurements and observations. In 7th grade, students will generate questions that can be answered through scientific investigation (7-1.2) and will critique a conclusion drawn from a scientific investigation (7-1.6). In 8th grade, students will construct explanations and conclusions from interpretations of data obtained during a controlled scientific investigation (8-1.3) and will generate questions for further study on the basis of prior investigations (8-1.4).

It is essential for students to know that data from an investigation can be organized in tables and graphs so that a valid conclusion can be drawn.

- A *valid conclusion* is an explanation based on observations and collected data that states the relationship between the independent (manipulated) and dependent (responding) variables.
- Inferences are sometimes needed to help form a valid conclusion.
 - An *inference* is an explanation or interpretation of an observation based on prior experiences or supported by observations made in the investigation.
- A conclusion statement should include a comparison of the results of the investigation to the hypothesis.
- Communicating the results of an experiment (in diagrams or graphs) allows others to evaluate and understand the investigation.
- The conclusion can be presented in written form and/or orally.

It is not essential for students to generate a new question or new hypothesis from the results of an investigation.

Assessment Guidelines:

One objective of this indicator is to *evaluate* results of an investigation to formulate a valid conclusion based on evidence and communicate the findings of the evaluation in oral or written form; therefore, the primary focus of assessment should be to make judgments about an investigation based on the results. However, appropriate assessments should also require students to *recognize* a valid conclusion for a given investigation; *compare* data recorded with the steps in the investigation; *identify* and *exemplify* observations and inferences used to formulate a valid conclusion; *compare* the conclusion with the hypothesis; *explain* the results of an investigation; or *identify* graphs which correctly represent given data.